

EXTENSIONS OF REMARKS

AMERICA'S SPACE PROGRAM
SPURS EDUCATIONAL EFFORTS
TO TRAIN MORE SCIENTISTS,
ENGINEERS

HON. JENNINGS RANDOLPH

OF WEST VIRGINIA

IN THE SENATE OF THE UNITED STATES

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Mr. RANDOLPH. Mr. President, Americans pride themselves in our scientific advances, in the acquisition of high technology which produces everything from wristwatch television to Space Shuttles. A quarter-century ago, jarred by the launching of the Soviet's Sputnik, America entered the space race through our academic and scientific community. Scholarships produced today's achievers in technology.

But in recent years, the public interest in space exploration has lagged. The flights of Space Shuttles become "routine," the planned November 11 launch of the *Columbia's* first operational mission will provide temporary public distraction operation from everyday problems.

This attitude presents a danger to space operation and to every facet of our scientific endeavors. Educators today are concerned that the apparent lack of public interest in science reflects the feeling of many young people who choose not to study engineering and the hard sciences.

Dr. James M. Beggs, Administrator of the National Air and Space Administration, pinpointed this concern recently by comparing our educational effort with other nations. He said:

The United States is turning out 80,000 engineering graduates a year. This is far fewer than some of our most powerful rivals in many high-technology fields. For example, the Soviet Union graduates 300,000 engineers annually, five times the number of the United States. And Japan, with less than half our population, graduates 75,000 engineers a year.

Mr. President, last month my alma mater, Salem College, awarded honorary degrees to Dr. Beggs and Thomas G. Pownall, president and chief executive officer of Martin-Marietta Corp. Mr. Pownall, a native West Virginian, was the principal speaker at our second annual Festival of Flight. We also honored aviation and space pioneers Senator HARRISON H. SCHMITT, Michael Collins, Arthur Hyde, another West Virginian, and ABC Science Editor Jules Bergman.

The following day, Dr. Beggs addressed the annual luncheon of the National Youth Science Camp on Capitol Hill. He urged the NYSC delegates, one of the outstanding high school science students from each State—to continue their study in science and space, and to turn their dreams into reality.

Mr. President, I submit for the RECORD the addresses of Dr. Beggs and Mr. Pownall, both of whom focus on the question of America's future in science, and whose remarks will provide enlightened insights for my colleagues and many others.

The material follows:

REMARKS BY JAMES M. BEGGS

I am delighted to be here and extremely pleased to be introduced for the second time in 3 days by my good friend, Senator Jennings Randolph, your host. Yesterday, I was privileged to receive an honorary degree from Salem College, the Senator's alma mater. So I feel it is a special privilege to have been invited to speak to you today and look forward to your questions following this brief talk.

First, let me congratulate you all on having been chosen by your respective States to attend this 20th Annual National Youth Science Camp. You are a star-studded group and your leadership and scholastic achievements are overwhelmingly impressive. Having read your biographies, I am reminded of President Kennedy's remarks back in 1972 at a White House dinner honoring noble laureates. He said: "I think this is the most extraordinary collection of talent, of human knowledge, that has ever been gathered together at the White House, with the possible exception of when Thomas Jefferson dined alone."

No doubt some of you may well be White House guests at some future dinner for Nobel laureates. But as we look to the future, I think we need to remind ourselves that past achievements are no guarantee of future performance. Indeed, in government, in industry and in the cases of individuals, it is clear that what we can do tomorrow depends on how we replenish our working capital today.

Our Nation's working capital rests in the potential of young people like yourselves. You are the high achievers of today and will be the leading scientists and engineers of tomorrow. And there is no question that the United States needs your talents and skills if we are to maintain our technological edge in the world.

Twenty years ago, when the youth science camp program began, the United States was the leading technological power in the world. We had come from behind the Russians and were leading in space. We were first in aeronautical and other high-technology development projects and we led the world in scientific achievements. But today, although we still lead in many areas of high technology, our supremacy is being increasingly challenged by foreign competitors.

We are feeling the pinch in every major industry, as the competition in Japan and Europe, using our methods and the technology we developed, is beating us at our own game. Whereas, just 10 years ago, the U.S. would capture all Nobel prizes in the hard sciences, this is no longer so. Indeed, the signs of strain are such that it is no exaggeration to say that our accustomed preeminence in science and technology—on which a large part of our security and economic power depends—is so fragile that it is seriously endangered.

A few statistics help tell the story. The United States is turning out some 80,000 engineering graduates a year. This is far fewer

than some of our most powerful rivals in many high-technology fields. For example, the Soviet Union graduates 300,000 engineers annually, five times the number of the United States. And Japan, with less than half our population, graduates 75,000 engineers a year.

Moreover, for more than a decade, secondary school curriculum requirements and achievement in this country have fallen sharply in science and mathematics, while there has been an opposite trend in most other developed countries. The result has been a shortage in the United States of well-trained scientists and engineers that affects adversely our scientific and industrial productivity.

This is a serious problem. It is serious because a vigorous scientific research and high-technology base are the key to a nation's productivity, economic growth, national security and high standard of living for its people. Over the past few decades we led the world in high technology. And during this period Americans enjoyed the highest standard of living ever known. We provided higher real income by raising productivity, and did that, to a large extent, through technological innovation.

We certainly are not the kind of people to sit idly by and let the rest of the world overtake us and leave us behind. We are a pioneer people, whose restless urge to explore the unknown and to excel built this Nation.

Our last quarter century in space has been magnificent.

We have sent 12 Americans to walk on the Moon. We have explored most of the solar system, and, we hope, by the decade will have explored all of the planets except Pluto and Neptune. We have built a new reusable space transportation system—the Space Shuttle—which will go into routine operation in October, opening unlimited opportunities in space for science, commerce and our national defense through the 1980's and beyond. So you are arriving on the scene at just the right time.

And the next 25 years hold the promise of so much more. Next year we will be flying the Space Lab, a gift from our European Space Agency friends, which will provide a shirt-sleeves environment for scientists and engineers to pursue their experiments in space. In 1985, we will fly the large Space Telescope, probably the most scientific instrument we have ever put into orbit. And in the future, we will be living and working in space on a permanent basis, building new structures for communications, Earth observations and many other purposes only limited by our imaginations.

Because any great civilization depends not on any particular knowledge, but on the continuing disposition to crave knowledge and know the unknown, we will continue to explore the vastness of space—simply because it is there.

Theodore Roosevelt once said that "The best prize life has to offer is the chance to work at work worth doing." You have chosen to pursue that prize in science and technology and if our past experience is any judge, you will be well rewarded.

All of us at NASA, I believe, have won that prize and we hope that one day you will be joining us in this great adventure of building our Nation's future in space. And in the process, we will continue to gain new knowledge strengthen our economy, fuel a

national sense of pride at home and prestige abroad, and I believe, inspire other young people, like yourselves, to dream great dreams and to transform them into reality.

And perhaps the most important reason for our work is a quote from a poem written by T. S. Eliot:

"We shall never cease from exploration and the end of all our exploring will be to arrive at where we started and to know the place for the first time." That says it all.

Thank you very much.

REMARKS OF THOMAS G. POWHALL

You have honored me on a plane far higher than I could have ever dreamed when I was a lad growing up in this remarkable State of West Virginia. Also, you have presented me—in your suggestion that I talk to you about space exploration—with an overwhelming topic. I say overwhelming because, in fact, I believe that mankind's future in space has no boundary lines. The subject and its implications are enormous beyond comprehension. Within less than three decades. Within beyond comprehension. Within less than three decades, within the lifetime of every one of us here, space exploration has changed forevermore the way we must think of our universe.

We have brushed back some, a few, of the curtains of natural ignorance that hung for all of prior history between Earth and the universe beyond. Who among us will ever forget the summer's Sunday in 1969—14 years ago—when one our kind set first one foot and then the other onto the Moon's surface. And since then we have peered further over the edge of the universe, to sample the surface of Mars and to look in awe at the wondrous realities of other planets.

And we have barely begun.

So splendid have been our technological, scientific, and engineering accomplishments in space that we have tended to devalue, or perhaps entirely overlook, an aspect of space exploration that has spiritual overtones. By that, I mean space exploration can be also viewed as adventure of the very highest order.

Think of it in your own, personal lives—the exhilaration that arises from the occasional opportunity presented to break some new ground. To do something different. To accomplish a personal "first." In this sense, I think it is proper to stand back and to strive for a special view. In doing so, I conclude that the exploration of space during the past quarter century—the time span from Sputnik to now—has been the spice of our national existence. Whether or not you choose to share my perspective, I believe it is beyond argument that in Projects Mercury, Gemini, and Apollo we were given dramatically uplifting and inspirational counterpoints to the rare and problems and complications of everyday living. Of our earthly society, I was reminded again of this aspect of space exploration on our independence day just past. When nearly a half-million proud Americans seized upon the moment to gather in the California desert. To watch in person the triumphant return from space of the Shuttle vehicle Columbia. I dare say most of the untold millions of others who looked in by television on that event shared vicariously in the emotion of the moment. It is not too much, I think, to place high value on the sense of national self-esteem and prestige that flowed from that event—and from other events in the sparkling sequence of accomplishments in Earth orbital and planetary ventures that we have undertaken since the enactment by Congress in 1968 of the National Space Act and the creation of the Na-

tional Aeronautics and Space Administration.

Now, clearly that act and that agency were given to the country with larger ambitions than to lift up our spirits on occasions of high and intense drama. But let me say again that, personally, I feel this is a tremendously valuable collateral benefit. I just happen to feel this way because I think that whatever encourages us to have national pride and self-esteem is important in this complicated world. If we have no respect for ourselves, we surely will have none for our Nation—and we will neither earn nor merit the respect or admiration of other peoples or of other nations.

These simple truths, I am aware, are not by themselves alone enough to maintain the wide spread of support that has been required to bring us this far—or will be necessary to keep us as a nation on a coherent and logical course in the future. I am reasonably certain that Mr. Beggs and all of his predecessors in the Space Agency agree with that. I daresay also that everyone of us has heard in some context or another voice given to the plaintive question:

"If we can go to the Moon, why can't we...?" And you can just about end the question with any subject, any problem imaginable.

One may be tempted to dismiss such a question as irrelevant. But what it really is, I think is evidence of frustration. Of a deep-down craving for equal progress in so many areas of material need.

In fact, there have been elemental and breath-taking leaps forward in the acquisition of fundamental knowledge through our space activities. And by no means have these been esoteric. Many have had relevance to our earthly needs—better management of natural resources, mind-stretching improvements in communications, simply outstanding advances in weather monitoring and forecasting, to mention but a few.

An eminent panel of NASA's brightest minds, addressing the evidence of seeming public lassitude about space a few years ago, concluded that—in their words—"The most striking effects of the space experience are likely to come in the years just ahead, as humans who have lived entirely within the space age become adults." And to quote further briefly from their conclusion: "We do not know yet what kind of a society it will be in which space is regarded as a natural arena for human endeavor and for the solving of human problems."

This suggests—and I think it is true—that we as a people do not yet know how we should value space exploration and space development.

What are the terms on which we look at its future, apart from its embodiment of technological accomplishment and its contributions to our national sense of self-esteem and accomplishment on those occasions when we as citizens are all tuned in for high adventure?

In such a setting as this, dominated by academic thought and respect for knowledge and learning, it is quite appropriate to remind ourselves that sweeping societal benefits most often have not been evident until many years after a scientific discovery or a technological breakthrough. At this time, it can be left only to the most inspired human imaginations to conceive what may be the ultimate benefits from space science and space technology.

We cannot, we must not turn back. In fact what we need most to understand right now is that there is so much we do not know—and then go for it! We are in good shape to do that.

The allocation of national treasure to attain these ends will, I recognize, involve

hard decisions. Hard tradeoffs, uneasy accommodations with large societal segments that feel a need for immediate improvement of the human condition should flow from all sizeable expenditures for any large goal.

The finest arts of political diplomacy, nevertheless, should be mustered, and promptly, I think for a broad-based action program that would encompass, among others, such goals as these:

A firm commitment to a specific plan for the remainder of this century. It should cover expansion and operation of the Shuttle system. It should assure a vigorous program of civil and national security operations in Earth orbit. It should incorporate a stable program, with a firm sense of continuity, for planetary exploration in the interest of pure scientific knowledge. It should commit the basic support for long-range new technology, not only in Federal laboratories but in those of universities and of industry, as well. Some of the fertile evident fields for exploration include propulsion, materials, large structures, robotics, and life-support systems.

Such a program for the remainder of this century also should, it seems to me, encourage the private sector to invest in applied research and development of space technologies, with proper incentives for introducing beneficial space results into commercial marketplaces.

There is more, but the foregoing is sufficient to illustrate the character and the size of the challenge to our national processes—indeed, to our national will.

To accept the challenge is to declare ourselves a great and confident people, not afraid of the future but ready to embrace it.

Thank you.